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मानक

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IS 13630-12 (2006): Ceramic Tiles - Methods of test, Sampling and Basis of Acceptance, Part 12: Determination of resistance to deep abrasion - Unglazed tiles (see IS 13630 : Parts 1 to 15) [CED 5: Flooring, Wall Finishing and Roofing]



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Bhartrhari—Nitiśatakam

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IS 13630 (Part 12) : 2006

भारतीय मानक
सिरैमिक टाइलें - परीक्षण पद्धतियाँ,
नमूने लेने तथा स्वीकार्यता का आधार
(पहला पुनरीक्षण)

Indian Standard

CERAMIC TILES — METHODS OF TEST,
SAMPLING AND BASIS FOR ACCEPTANCE

(First Revision)

ICS 91.100.23

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (Parts 1 to 15) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Flooring, Wall Finishing and Roofing Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was first published in various parts in 1992-93. This is the first revision; having all parts combined in one publication, of the standard in which the following major changes have been incorporated:

- a) As per the decision taken in the last meeting, the requirements of all the parts have been included in one volume and the revised standard has been brought in line with ISO 10545 (various parts).
- b) The requirements for determination of bulk density have been added in Part 2 and a few changes have been made in the requirements for determination of water absorption.
- c) A few modifications have also been made in Part 3.
- d) Requirements for determination of breaking strength have also been added in Part 6.
- e) Requirements for determination of glazing resistance tests have also been modified in Part 9.
- f) A new test for determination of impact resistance by measurement of co-efficient of restitution has been added as Part 14.
- g) IS 13711 : 1993 'Sampling and basis for acceptance' has been amalgamated with Part 15 of this standard.

In formulation of this standard considerable assistance have been derived from the following standards:

- ISO 10545-1 : 1995 Ceramic tiles — Part 1 : Sampling and basis for acceptance
- ISO 10545-2 : 1995 Ceramic tiles — Part 2 : Determination of dimensions and surface quality
- ISO 10545-3 : 1995 Ceramic tiles — Part 3 : Determination of water absorption, apparent porosity, apparent relative density and bulk density
- ISO 10545-4 : 2004 Ceramic tiles — Part 4 : Determination of modulus of rupture and breaking strength
- ISO 10545-5 : 1996 Ceramic tiles — Part 5 : Determination of impact resistance by measurement of coefficient of restitution
- ISO 10545-6 : 1995 Ceramic tiles — Part 6 : Determination of resistance to deep abrasion for unglazed tiles
- ISO 10545-7 : 1996 Ceramic tiles — Part 7 : Determination of resistance to surface abrasion for glazed tiles
- ISO 10545-8 : 1994 Ceramic tiles — Part 8 : Determination of linear thermal expansion
- ISO 10545-9 : 2004 Ceramic tiles — Part 9 : Determination of resistance to thermal shock
- ISO 10545-10 : 1995 Ceramic tiles — Part 10 : Determination of moisture expansion
- ISO 10545-11 : 1994 Ceramic tiles — Part 11 : Determination of crazing resistance for glazed tiles
- ISO 10545-12 : 1995 Ceramic tiles — Part 12 : Determination of frost resistance
- ISO 10545-13 : 1995 Ceramic tiles — Part 13 : Determination of chemical resistance
- ISO 10545-14 : 1995 Ceramic tiles — Part 14 : Determination of resistance to stains
- ISO 13006 : 1998 Ceramic tiles — Definitions, classification, characteristics and marking

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***CERAMIC TILES — METHODS OF TEST,
SAMPLING AND BASIS FOR ACCEPTANCE****PART 12 DETERMINATION OF RESISTANCE TO DEEP ABRASION —
UNGLAZED TILES***(First Revision)***1 SCOPE**

This standard (Part 12) covers a method of test for determining the resistance to deep abrasion of all unglazed ceramic tiles used for floor coverings.

2 REFERENCES

The standards listed below are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
2062 : 1999	Steel for general purposes (<i>fifth revision</i>)
11643 : 1985	Specification for silicon carbide for bonded abrasive products

3 PRINCIPLE

Determination of the abrasion resistance of unglazed

ceramic tiles by measuring the length of the groove produced in the proper surface by means of a rotating disc under given conditions and with the use of abrasive material.

4 ABRASIVE MATERIAL

White fused aluminum oxide conforming to the grain size requirement of Grit No. 80 of Table 1 of IS 11643.

5 APPARATUS

5.1 Abrasion Apparatus — It consists essentially of a rotating disc, a storage hopper with dispensing device for the abrasive material; a test specimen support and a counterweight (*see Fig. 1*).

5.1.1 The disc is made of Fe 410-S steel as specified in IS 2062, with a diameter of 200 ± 0.2 mm, and

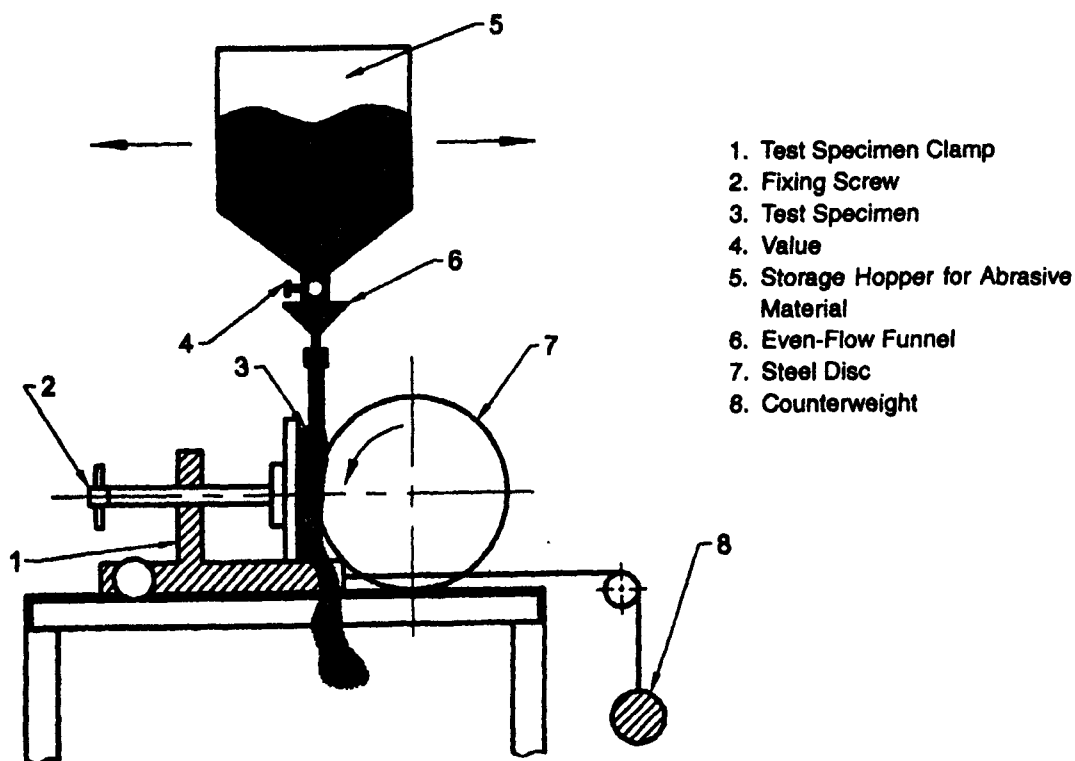


FIG. 1 ABRASION APPARATUS

thickness at the edge of 10 ± 0.1 mm, and with a rate of revolution of 75 rev/min. The pressure with which test specimens are held against the steel disc is determined by calibrating the apparatus against Austrian Standard Granite. The pressure is adjusted such that, after 300 revolutions a chord of 32 mm is produced.

5.1.2 When the diameter has worn to 199 mm, the steel disc shall be replaced.

5.2 A Measuring Gauge — Capable of measuring to 0.1 mm.

6 TEST SPECIMENS

6.1 Types of Test Specimens

Test shall be carried out using whole tiles or test specimens of suitable dimensions. Before testing, small specimens shall be fixed with an adhesive on to a larger background, avoiding joints.

6.2 Preparation

Clean, dry test specimens shall be used.

6.3 Number of Test Specimens

A minimum of five test specimens shall be tested.

7 PROCEDURE

7.1 Place a test specimen in the apparatus so that it is tangential against the rotating disc. Ensure that the feed of abrasive material into the grinding zone is uniform at a rate of at least 100 g/100 revolutions.

7.2 Rotate the steel disc for 150 revolutions. Remove the test specimen from the apparatus and measure the chord length of the groove by means of the measuring gauge to the nearest 0.5 mm. Test each specimen in at

least two places at right angles on its proper surface.

7.3 If relief surfaces would interfere with the determination of the abrasion resistance, the projections may be ground off but the results of the test will not be the same as for tiles having plane surfaces.

8 EXPRESSION OF RESULTS

8.1 The resistance of deep abrasion is expressed as the volume V of material removed, in cubic millimetres. This is calculated from the chord length l of the groove by means of the expression:

$$V = \{(\pi \cdot \alpha / 180) - \sin \alpha\} h \cdot d^2 / 8$$

where

$$\frac{\sin \alpha}{2} = \frac{l}{d}$$

d = diameter of the rotating disc, in mm;

h = thickness of the rotating disc, in mm;

α = angle (in degrees) subtended at the centre of the rotating disc by the chord (see Fig. 2); and

l = length of the chord, in mm.

8.2 Some equivalent values are given in Table 1.

9 TEST REPORT

The test report shall contain the following:

- a) Description of the tiles;
- b) Chord length l of each groove to the nearest 0.5 mm;
- c) Volume V in cubic millimetre, for each individual groove; and
- d) Average volume V_m , in mm^3 .

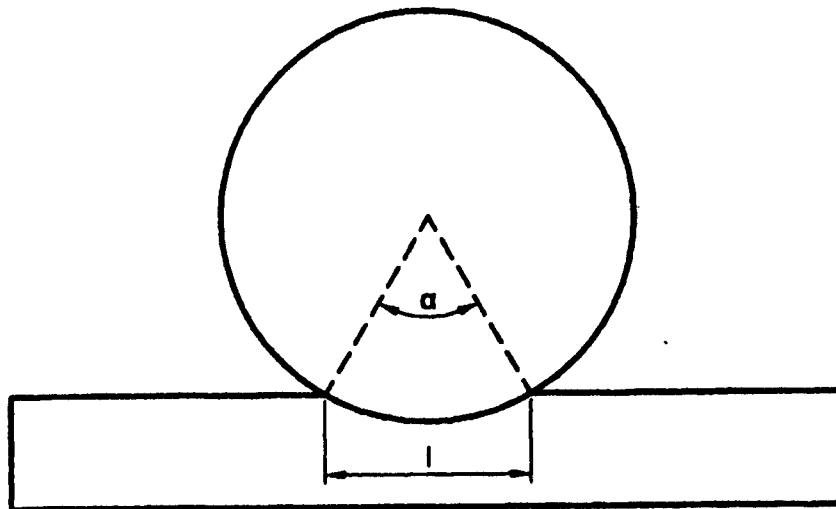


FIG. 2 DEFINITION OF CHORD

Table 1 Equivalent Value
(Clause 8.2)

<i>l</i>	<i>v</i>	<i>l</i>	<i>v</i>	<i>l</i>	<i>v</i>	<i>l</i>	<i>v</i>	<i>l</i>	<i>v</i>
mm	mm ³	mm	mm ³	mm	mm ³	mm	mm ³	mm	mm ³
20.0	67.0	30.0	227	40.0	540	50.0	1 062	60.0	1 851
20.5	72.0	30.5	238	40.5	561	50.5	1 094	60.5	1 899
21.0	77.0	31.0	250	41.0	582	51.0	1 128	61.0	1 947
21.5	83.0	31.5	262	41.5	603	51.5	1 162	61.5	1 996
22.0	89.0	32.0	275	42.0	626	52.0	1 196	62.0	2 046
22.5	95.0	32.5	288	42.5	649	52.5	1 232	62.5	2 097
23.0	102.0	33.0	302	43.0	672	53.0	1 268	63.0	2 149
23.5	109.0	33.5	316	43.5	696	53.5	1 305	63.5	2 202
24.0	116.0	34.0	330	44.0	720	54.0	1 342	64.0	2 256
24.5	123.0	34.5	345	44.5	746	54.5	1 380	64.5	2 310
25.0	131.0	35.0	361	45.0	771	55.0	1 419	65.0	2 365
25.5	139.0	35.5	376	45.5	798	55.5	1 459	65.5	2 432
26.0	147.0	36.0	393	46.0	824	56.0	1 499	66.0	2 479
26.5	156.0	36.5	409	46.5	852	56.5	1 541	66.5	2 537
27.0	165.0	37.0	427	47.0	880	57.0	1 583	67.0	2 595
27.5	174.0	37.5	444	47.5	909	57.5	1 625	67.5	2 636
28.0	184.0	38.0	462	48.0	938	58.0	1 669	68.0	2 717
28.5	194.0	38.5	481	48.5	968	58.5	1 713	68.5	2 779
29.0	205.0	39.0	500	49.0	999	59.0	1 758	69.0	2 842
29.5	215.0	39.5	520	49.5	1 030	59.5	1 804	69.5	2 906

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This Indian Standard has been developed from Doc: No. CED 5 (7358 to 7372).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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